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EXAMINER

ROSARIO, DENNIS

ART UNIT PAPER NUMBER

2624

DATE MAILED: 05/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|--------------------------------------|-------------------------------------|--|
| Office Action Summary | Application No. 09/880,207 | Applicant(s) BRULS ET AL. | |
| | Examiner Dennis Rosario | Art Unit 2624 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on amt4/17/2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-6 and 9-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-6 and 9-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 6/13/01 & 6/21/04 & 10/29/04 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The amendment was received on April 17, 2006. Claims 3-6 and 9-16 are pending.

Specification

2. Due to the remarks of the objection to the specification, the objection of the specification is withdrawn.

Response to Arguments

3. Applicant's arguments on page 10, filed 4/17/2006 have been fully considered but they are not persuasive and states:

"As explained in Applicants' last Response, a 'spread' is a measure based on differences between pixel values, hence a 'spatial spread' is a measure based on the differences between pixel values in the same image. While May discloses 'a set of original pixel values (P_t , M_i) in at least one image', there is no disclosure of 'determining a spatial spread of a set of original pixel values'."

However, the examiner respectfully disagrees, since claim 3 is broad enough so that May (US Patent 6,067,125 A) discloses determining a spatial spread (or equation 5 that is a difference or spread function as shown in col. 5, line 21 or also referred to as "variance" in col. 5, line 19 of one image) of a set of original pixel values (represented as variable p_i that correspond to any one of the pixels 201a-201e of fig. 2). Note that equation 5 does not explicitly show variable p_i . Rather equation 5 is a function of "sum of squares" in col. 5, line 20 and "scaled mean value" in col. 4, line 51. Where each of scaled mean value and sum of squares is a function of p_i , which corresponds to the claimed original pixel values, as shown in equation 3 on col. 4, line 55 and equation 4 in col. 5, line 7, respectively. Thus, giving a broadest reasonable interpretation equation 5 is calculating a difference between pixel values, p_i , of the same image through the use of the scaled mean value and the sum of squares value that are both a function of p_i which corresponds to the claimed pixel values in the same image.

4. Applicant's arguments on page 11 filed 4/17/2006 have been fully considered but they are not persuasive and states:

"Since as noted above, May neither discloses nor suggests determining the 'spatial spread', then May can neither disclose or suggest determining statistics from the spatial spread."

However, the examiner respectfully disagrees since May discloses determining the 'spatial spread' as discussed in paragraph 2 above, then May discloses determining statistics (or "scaled variance σ^2 " in col. 5, line 25) from the spatial spread (since the scaled variance is determined once the difference between the scaled mean value and the sum of squares value is determined).

5. Applicant's arguments on page 11 filed 4/17/2006 have been fully considered but they are not persuasive and states:

"However, Applicants submit that claims 15 and 16 both claim 'computing means for determining a spatial spread of a set of original pixel values (P_t , M_i) in at least one image of the image sequence ($V1$)'."

The examiner assumes that the applicant's argument that May et al. (US Patent 5,844,627 A) does not teach the above statement. However, the examiner respectfully disagrees since May et al. shows a computing means (fig. 2,num. 201a) for determining a spatial spread (since fig. 2,num. 201a determines a "variance" in col. 2, line 67) of a set of original pixel values (P_t , M_i) (as shown by a shaded region in fig. 3A) in at least one image of the image sequence ($V1$).

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 3-6 and 9-14 are rejected under 35 U.S.C. 102(e) as being anticipated by May (US Patent 6,067,125 A).

Regarding claims 1, May discloses a method of noise filtering an image sequence (V1), comprising the steps of:

a) determining a spatial spread (Equation (5) in column 5) of a set of original pixel values (P_t , M_i) (Fig. 2, numerals 201a-201e and represented as " p_i " in equations (3) in column four and (6) in column five.) in at least one image (fig. 2, num. 200) of the image sequence (V1) (Fig. 1, num. 105);

b) determining statistics (Fig. 1, num. 102 determines "statistics" in col. 4, line 39 or "variance σ^2 " in col. 5, line 19) from said spatial spread in said at least one image of the image sequence (v1); and

c) calculating at least one filtered pixel value (P_t') (" w_i " in col. 5, line 30) from the set of original pixel values (P_t, M_i) obtained from said at least one image, wherein the original pixel values (P_t, M_i) are weighted (via " α " of equations (6) and (7) in column 5) under control of the statistics (via the above mentioned variance σ^2 in equation (7) in column 5)

d) wherein said method further comprises the step of:

d1) determining a temporal spread (S_{temp}) (Equation 10 in column 6) of a pixel (P_t) (" $P_i^{(0)}$ " in equation 10) of the set of original pixel values (P_t, M_i) and a corresponding pixel (" $P_i^{(-1)}$ " in equation 10) from at least one other image of the image sequence.

Regarding claim 4, May discloses the method of noise filtering as claimed in claim 3, wherein the spread (S) is a sum of absolute differences (As shown in equations (4) and (5). Note that the claimed absolute differences is interpreted as a squaring function shown in equations (4) and (5).), a given absolute difference being obtained by subtracting an average pixel value from a given original pixel value (P_t, M_i).

Regarding claim 5, May discloses the method of noise filtering as claimed in claim 3, wherein the set of original pixel values (P_t, M_i) includes a central pixel value (P_t) and surrounding pixel values (M_i) (as shown in fig. 2), wherein as a result of the noise filtering, the central pixel value (P_t) is replaced by the filtered pixel value (P_t') (upon the output of fig. 1,num. 104).

Regarding claim 6, May discloses the method of noise filtering as claimed in claim 3, wherein the step of calculating comprises the steps of:

- a) weighting the set of original pixel values (P_t, M_i) (via " α " of equation six.) under control of the statistics to obtain a weighted set of pixel values (P_t, N_i) (" αp_i " of equation six.); and
- b) furnishing the weighted set of pixel values (P_t, N_i) to a static filter ("Wiener filter" in col. 5, line 26), in which the at least one filtered pixel value (P_t') is calculated from the weighted set of pixel values (P_t, N_i) (As shown in equation six.), and
- c) wherein the set of weighted pixel values (P_t, N_i) is obtained by taking, for each pixel value in the set of original pixel values (P_t, M_i), a combination of a portion α (as shown in equation six as " αp_i ".) of said each pixel value in the set of original pixel values (P_t, M_i) and a portion $1-\alpha$ (as shown in equation six as " $(1-\alpha)\mu$ " where μ is related to p_i in equation three) of a central pixel value (P_t) (" P_i " in equation three includes the claimed central pixel value or "observed value of the pixel itself, indicated by reference numeral 201a [of fig. 2]" in col. 4, line 12).

Regarding claim 9, May discloses the method of noise filtering as claimed in claim 3, wherein the step of calculating comprises the steps of:

- a) weighting the set of original pixel values (P_t, M_i) (via " α " of equation six.) under control of the statistics to obtain a weighted set of pixel values (P_t, N_i) (" αp_i " of equation six.); and

b) furnishing the weighted set of pixel values (P_t, N_i) to a static filter ("Wiener filter" in col. 5, line 26), in which the at least one filtered pixel value (P_t') is calculated from the weighted set of pixel values (P_t, N_i) (As shown in equation six.), and

c) wherein the at least one filtered pixel value (P_t') is obtained by calculating an average ("variance" in col. 5, line 19) of the weighted set of pixel values (P_t, N_i).

Regarding claim 10, May discloses the limitations of claim 10 in claims 1 and 3 above and the remaining limitation of:

wherein the spatially displaced original pixel values are weighted (in equation 6 in column 5) under control of the spatial spread (S_{spat}) (equation 5), and the temporally displaced original pixel values (P_t, P_{t1}, P_{t2}) are weighted (via " βf_i " in equation 12 in column 6) under control of the temporal spread (S_{temp}) (via equations 10 and 11 in column 6.).

Regarding claim 11, May discloses the method of noise filtering as claimed in claim 10, wherein the weighting step comprises:

a) dividing the weighted temporally displaced original pixel values (Using equation 7 in column 5 as mentioned in col. 6, lines 31-37) to lessen their weight in the filtering.

Regarding claim 12, May discloses the method of noise filtering as claimed in claim 10, wherein the temporally displaced original pixel values include two original pixel values (P_{t1}, P_{t2}) (Fig. 2, num. 201e and 201a) from different fields in a same frame (F_0) ("current frame" in col. 6, line 14) and at least one original pixel value (Fig. 2, num. 201e) of a previous frame (F_{-1}) ("previous frame" in col. 6, line 16).

Regarding claim 13 see fig. 1,num. 101.

Regarding claim 14, may discloses all of the limitations of claim 14 as discussed in claim 1 above and the remaining limitation of:

encoding ("encoding" in col. 3, line 55) a plurality of filtered images (via "(IIR) filter" in col. 3, line 45).

8. Claim 3 is rejected under 35 U.S.C. 102(e) as being anticipated by Zhang et al. (US Patent 6,037,986 A).

Regarding claim 3, Zhang et al. discloses a method of noise filtering an image sequence (V1), comprising the steps of:

a) determining a spatial spread (or "pel difference" in col. 8, line 55) of a set of original pixel values (P_t , M_i) (fig. 6, labels: " $p(l-2,j)$ " and " $p(l,j)$ ") in at least one image of the image sequence (V1);

b) determining statistics (Fig. 3,num. 42) from said spatial spread in said at least one image of the image sequence (v1); and

c) calculating at least one filtered pixel value (P_t') (The output of fig. 3,num. 36) from the set of original pixel values (P_t , M_i) obtained from said at least one image, wherein the original pixel values (P_t , M_i) are weighted (via "filter coefficients" in col. 12, line 13) under control of the statistics,

d) wherein said method further comprises the steps of:

d1) determining a temporal spread (S_{temp}) of a pixel (P_t) of the set of original pixel values (P_t , M_i) and a corresponding pixel from at least one other image of the image sequence (see col. 6, lines 41-55).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over May (or May I) (US Patent 6,067,125 A) in view of May et al. (or May II) (US Patent 5,844,627 A).

Regarding claim 15, May I teaches a method of noise filtering an image sequence (V1), comprising the steps of:

- a) determining a spatial spread (Equation (5) in column 5) of a set of original pixel values (P_t , M_i) (Fig. 2, numerals 201a-201e and represented as " p_i " in equations (3) in column four and (6) in column five.) in at least one image (fig. 2, num. 200) of the image sequence (V1) (Fig. 1, num. 105);
- b) computing means (Fig. 1, num. 102) for determining statistics (Fig. 1, num. 102 determines "statistics" in col. 4, line 39 or "variance σ^2 " in col. 5, line 19) from said spatial spread in said at least one image of the image sequence (v1); and
- c) filtering means ("Wiener filter" in col. 5, line 26) for calculating at least one filtered pixel value (P_t') (" w_i " in col. 5, line 30) from the set of original pixel values (P_t , M_i) obtained from said at least one image, wherein the original pixel values (P_t , M_i) are weighted (via " α " of equations (6) and (7) in column 5) under control of the statistics (via the above mentioned variance σ^2 in equation (7) in column 5).

May I does not teach a means for determining a spatial spread and instead teaches that a variance can be used in a Weiner filter in col. 5, lines 25,26. Thus, May I suggests that something calculates the variance, but May I does not specifically show what calculates the variance.

May II shows a means for calculating a variance in fig. 2, numerals 201a and 202.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify May I equation of calculating a variance with May II's teaching of a means for calculating a variance because, May II's teaching of a means for calculating a variance enables May I's equation for variance to output a variance value from May II's means for calculating a variance that can be inputted into May I's Weiner filter.

Regarding claim 16, May teaches all of the limitation of claim 16 in claim 15 above except for the remaining limitations of:

- a) receiving means for receiving filtered images ("terminal **106**" in col. 4, line 5); and
- b) a device (Fig. 1) for generating the filtered images of the image sequence.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dennis Rosario whose telephone number is (571) 272-7397. The examiner can normally be reached on 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


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